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New compounds have potential to combat Lyme disease

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When physicians diagnose Lyme disease, they usually prescribe standard antibiotics—and for many patients, that's enough. But for 10 to 20 percent of patients, the disease persists, causing joint paint, neurological difficulties and fatigue, among other symptoms.

New drugs, capable of completely eliminating the disease-causing bacteria Borrelia burgdorferi at the onset, are needed. Recently, a team of researchers at the School of Medicine have discovered a few promising leads.

In a study published April 1 in the journal *Drug Design, Development and Therapy*, the researchers tested 4,366 drug compounds for their efficacy against B. Burgdorferi in the lab. They picked the top 20, which have all been approved by the U.S. Food and Drug Administration for a variety of uses—one, for example, is used to treat alcohol abuse—and subjected them to additional tests. These compounds blocked the growth of between 95 and 99.8 percent of the bacteria in the samples.

For new cases of Lyme disease

A key caveat: These compounds could be beneficial for those with new cases of Lyme disease. The drugs are not being considered for use for patients who are currently struggling with persistent Lyme symptoms.

"We know the way we treat the patient during the acute period [after

infection] is critical. If we treat them with a very effective antibiotic that can kill the bacteria even in the beginning state, we can possibly avoid this 10 to 20 percent of patients who always have the disease," said Jayakumar Rajadas, PhD, senior author of the study and director of the medical school's Biomaterials and Advanced Drug Delivery Laboratory. The lead author is postdoctoral scholar Venkata Raveendra Pothineni, PhD.

Other groups worldwide are striving to improve treatments for Lyme disease. Rajadas attributed the team's preliminary success to access to the equipment, supplies and know-how to develop a new assay capable of quickly identifying the most successful compounds. The team used a technique called high-throughput screening, which rapidly allows researchers to examine hundreds of compounds.

Tests on the compounds are ongoing. "We are trying to take it to the clinic," said Rajadas, who is is also assistant director of the Cardiovascular Pharmacology Division of the Stanford Cardiovascular Institute and is a member of the Lyme Disease Working Group.

Laura Roberts, MD, professor and chair of psychiatry and behavioral sciences at Stanford and co-chair of the Lyme Disease Working Group, lauded the work.

"Dr. Rajadas and members of his laboratory have worked for years to dismantle barriers to understanding Lyme disease," she said. "The use of high-throughput screening to assess candidate compounds is a welcome innovation with important results for new drug development. Patients with chronic consequences of Lyme Borreliosis infection are waiting for new discoveries that will bring a cure. Dr. Rajadas' scientific efforts bring that day closer."